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ENTOMOLOGICAL NEWS

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A Japanese Weevil Abundant in the Philadelphia Area

By H. W. ALLEN [1, 2]

The Japanese weevil, *Pseudocneorhinus bifasciatus* Roelofs, appears to be increasing in numbers near Philadelphia. In 1956 it was one of the most abundant defoliating insects in this area, and despite its inconspicuous nature an increasing number of homeowners are becoming aware of its work.

Although injury to cultivated plants was first reported from Connecticut in 1924 (Britton), the earliest record of the weevil's occurrence in the United States is from specimens collected in 1914 in Philadelphia but not identified until years later (Buchanan 1946). Infestations of this insect in several heavily populated areas of the Eastern States are discussed by Smith (1955). According to Buchanan (1946), it occurred in Lansdowne, Pa., in 1940 and in Germantown in 1944. The author found it present in damaging numbers at Moorestown, N. J., in 1946 and again in 1948 (Allen 1948).

This weevil is distinctly polyphagous, and many host plants have been listed, but little has been published on its life history and habits. Buchanan dissected 55 specimens from Moorestown and found that only females were present. Smith (1955) noted that the beetles have fused wing covers and cannot fly, and that they deposit their eggs in partially eaten, curled leaves. He found that weevils infesting plants can be killed by application of dusts containing 5% of heptachlor or 2.5% of aldrin.

[1] Entomology Research Branch, Agricultural Research Service, U.S.D.A.
[2] E. L. Plasket assisted in the observations.

Observations by the author on food plants of the adult weevils are reported below. In the Philadelphia area privet hedges are commonly heavily infested and defoliated. Other plants that may be severely defoliated include azalea, perennial phlox, firethorn, and occasionally abelia, Japanese barberry, rose, climbing honeysuckle, Japanese quince, shrubby althea, forsythia, redbud, coralberry, hazelnut, flowering dogwood, chrysanthemum, and the sprouts or young plants of oak, sycamore, flowering crab, and walnut. Several large-leafed ornamentals not often defoliated, such as rhododendron, mountain laurel, English ivy, and lilac, are conspicuously disfigured by the feeding of the weevils. Feeding has been observed also on *Spirea vanhouttei, Euonymous radicans,* coral bell, perennial veronica, geranium, germander, wild sweet-william, and several common weeds including wild aster, lamb's-quarters, *Persicarea,* and northern bugleweed.

In 1956 a few adults were found on June 9. Thereafter they were observed frequently throughout the season until after the first heavy frosts. The peak of abundance was in late July, but beetles were still plentiful in late September, and feeding continued throughout that period. Early in August one side of a section of moderately infested privet hedge about 3 feet high was jarred over a 90-inch length of sheeting and 70 beetles were knocked down. On September 26, 170 beetles were collected in a few minutes from about 60 feet of azalea and privet, but on October 12 only one could be found on the same shrubs. In an indoor cage at room temperatures nearly all these beetles were alive and vigorous on October 25.

Although samples of soil from beneath heavily infested bushes and around the roots and crowns of adjacent weeds and grasses were examined several times between June and October, no larvae or pupae were found. Egg pods were found first on September 21, but may have been present earlier, since well-developed ovarian eggs were found in 2 of 20 females on August 2, and 14 of 20 on August 23. Among beetles collected on September 26 maximum oviposition occurred from September 28 to October 9. There seems to be no diapause in the egg

stage. By October 22 nearly all the eggs deposited from September 27 to 30 and kept at room temperatures had hatched. October hatching also occurred among eggs kept in an outdoor insectary. In late October one newly hatched larva was found in the soil beneath heavily infested privet. However, eggs deposited early in the month and bedded in dead leaves in the shade had not hatched by October 22. It appears that this insect starts hibernation in the egg stage, and also as small larvae in the soil.

The adult (Fig. 1) is a robust, brownish-gray weevil, 4.5 to 7 mm. long, with two broad, transverse black bands across the elytra. The snout is broad and only slightly longer than wide. Adults are sluggish and unable to fly; hence their dissemination must be chiefly by transport. Of 42 dissected during July and August none had membranous wings and all were females. No males have yet been found.

The adults are usually found in shaded areas. They frequent the foliage and twigs of host plants and the ground beneath them. They are present on foliage both day and night, and on both fair and rainy days. They may remain quiescent for long periods in the angle between leaf petioles and the stem of a twig, where they resemble axillary buds. They feed at the edge of the leaf, cutting out small sinuses and sometimes giving it a ragged, coarsely serrate appearance. Feeding continues from June to October, and may cause nearly complete defoliation by late summer. The beetles have a tendency to form clusters, and bunches of 3 to 20 may be seen on heavily infested plants. Defoliation is always progressively less from the ground level upward, and heavy feeding is not often found more than 6 feet from the ground. When there are many beetles feeding on a bush, the leaves below them are usually spotted with black, adhesive, more or less cylindrical fragments of excrement.

When infested shrubs are slightly jarred, most of the beetles drop to the ground, and some will drop when the shadow of a hand passes quickly before them. Beetles that have dropped to the ground are inactive for a minute or two, when they may be rolled about like small pellets of earth, but they soon regain activity and crawl away.

When the egg is first laid it is white, with a thin, translucent, flexible, unsculptured shell. It is about 1.1 mm. long by 0.35 mm. wide, and slightly enlarged at the posterior end. As the embryo develops, the egg becomes creamy yellow, and the light-brown mandibles of the larva are visible through the shell.

The eggs are usually deposited in inconspicuous folds at the margins of dead leaves or leaf fragments, but some have been found over the midrib near the petiole, and a few eggs have been found on green leaves. The free edge of the fold is sealed to the basal portion of the leaf fragment, enclosing the eggs like seeds in a pod. There may be one to eight eggs in a fold. In the natural habitat a few egg pods were found in the dead margins of leaves on azalea and lilac bushes. Several more were found in scattered leaf fragments under a privet hedge nearly free of trashy mulch, and others were located by diligent search in the copious leafy trash under infested rose and azalea. Caged beetles deposited eggs more freely in leaf fragments on the ground than in leaves or leaf fragments attached to the twigs in the feeding area, and this condition is probably true in the natural habitat. Of a total of 168 egg clusters deposited by caged beetles, 72% were found in the leafy debris on the ground.

Newly hatched larvae are creamy yellow with light-brown heads. They are footless, with long, sparse pubescence. On hatching they crawl from the egg pods, drop to the ground, crawl an inch or less over the surface, enter some depression, and quickly burrow into the soil. In a cage at room temperature several young larvae that were more than twice the size of the eggs were found in moist soil containing pieces of lilac roots. There seems to be little doubt that the larval stage develops in the soil under or close to the plant where the egg pods were deposited.

Moderate to heavy feeding on ornamentals by *P. bifasciatus* adults was observed in 1956 in Mt. Holly, Burlington, Moorestown, Maple Shade, Merchantville, Haddonfield, Palmyra, Riverton, Runnemede, Woodbury, Paulsboro, Williamstown, and Hammonton, N. J.; Langhorne, Bustleton, Germantown, Chestnut Hill, Whitemarsh, Conshohocken, and Phoenixville,

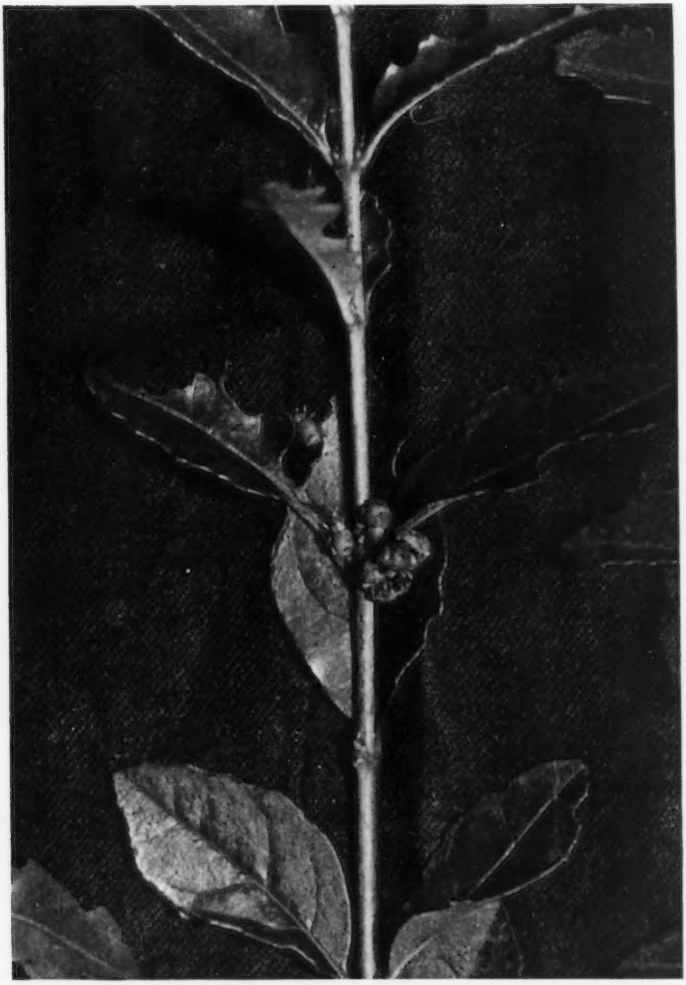

FIG. 1. A cluster of *Pseudocneorhinus bifasciatus* adults on a twig of privet.

Pa. These towns enclose an urban area of about 900 square miles. Infestation is apparent chiefly in built-up residential sections, particularly where there are well-shaded gardens bordered by shrubs and perennial plantings or by hedges. This area includes almost completely urban Philadelphia and Camden, and scores of towns, villages, and residential developments where the weevil thrives. It also includes more sparsely populated countryside where weevils are absent or not easily found.

In nearly all the towns listed above, more than half the privet hedges were found to be moderately to heavily infested. In Moorestown, N. J., interspersed among the many infested properties were gardens in which no beetles could be found. There were even hedges with practically no evidence of weevil injury directly across the street from heavily infested hedges.

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Review

General and Applied Entomology. By V. A. Little; A. and M. College of Texas. Pp. vii + 543; 323 figs. Harper and Brothers, 1957, New York 16, N. Y. Price: $7.00.

Most students take but one course in entomology. If this has to be one in applied entomology, we have here a book that will serve well as a text. It includes 35 pages of anatomy and physiology, and about that many on the principles of control; the rest is chiefly classification and biology. Each order has keys to principal families, and under each family one or more species is taken up in detail. When a family contains economic insects it is these that are chosen, and all the commoner pests receive adequate attention, *each under its proper order and family.*

In some applied texts, one studies in succession the pests of corn, cotton, etc., etc.; one never, for example, takes up aphids as aphids, since they are scattered about in the book under their host plants, and juxtaposed to entirely unrelated insects, which seems, somehow, a curious way to study entomology. Is this

(*Continued on p. 192*)

On the Removal of Certain New World Genera from the Decticinae to the Listroscelinae (Orthoptera; Tettigoniidae)

By James A. G. Rehn, Curator of Insects, Academy of Natural Sciences of Philadelphia

In 1900 the present author described a very unusual species of tettigoniid from the hot Rio Balsas valley of Guerrero, Mexico, as a new species (*imperfectus*) of the genus *Capnobotes*,[1] which latter was then and has since been consistently referred to the subfamily Decticinae. The other species of *Capnobotes* were then, and are yet, considered to be limited to the southwestern United States, but they undoubtedly also occur in arid northwestern Mexico. In 1901, after study of material of true *Capnobotes* not previously available, the author erected the new genus *Neobarrettia* for the species *Capnobotes imperfectus*,[2] dedicating it to the collector of the original material, Otis W. Barrett. In 1907, my friend and colleague, Mr. A. N. Caudell, in a revision of the North American Decticinae, established the genus *Rehnia*,[3] assigning to it two new species, *R. victoriae*, from Victoria, Guerrero, Mexico, and *R. spinosa*, from Texas. We now know *victoriae* from a relatively broad range of localities extending northward as far as Kansas, and *spinosa* conversely extending down into eastern Mexico. Two species have been added subsequently to *Rehnia*—*R. cerberus* Rehn and Hebard, from western Texas, and *R. sinaloae* Rehn and Hebard, from Sinaloa, Mexico.[4]

For some years past I have had the impression that both *Neobarrettia* and *Rehnia* were misplaced in the Decticinae, but only recently has it been possible for me to make the needed series of comparisons to prove or disprove this belief. It is now possible to say definitely that both genera do not belong to the Decticinae, but are instead members of the Listroscelinae, an

[1] Trans. Amer. Entom. Soc., XXVII, p. 89.
[2] Entom. News, XII, p. 16.
[3] Proc. U. S. Nat. Mus., XXXII, pp. 288, 305.
[4] Trans Amer. Entom. Soc., XLVI, pp. 234–244, (1920).

otherwise chiefly pan-tropical subfamily very well developed in South America.

The evidence for this conclusion has been drawn from the following structural features of the two genera, which fully agree with what we find in other representative genera of the Listroscelinae, and accordingly disagree with typical members of the Decticinae: (1) the very narrow, strongly and lamellately compressed fastigium; (2) the general structural pattern of the pronotum; (3) the strongly developed and paired spiniform processes on the prosternum, mesosternum and metasternum, not just on one or the other element, but on all; (4) the distinctly tuberculate or subspiniform process found on the internal surface of the coxae, particularly of the median and caudal limbs; (5) the well spined character of both of the ventral margins of the cephalic and median femora, and the relatively marked development of the spines on the ventral margins of the corresponding tibiae; and (6) the relative expansion and deplanation of the ventral surfaces of the cephalic and median femora, the latter a condition strongly developed in *Listroscelis* and other members of the subfamily.

The criteria used in the past for the separation of the subfamilies of the Tettigoniidae have frequently been the presence or absence of certain limb spines, which, increasingly, we know are of less diagnostic value than long supposed. For instance, the presence of a disto-dorsal spine on the external (caudal) margin of the cephalic tibiae often has been given much weight. In twenty-nine specimens of *Neobarrettia imperfecta* I find this spine present in twenty-eight, but in one individual curiously it is absent from the external margin but has shifted to the otherwise unspined internal (cephalic) margin. In fourteen individuals of *Rehnia sinaloae* this spine is present on both cephalic tibiae in all but one, in which it is present on one limb and absent from the other. In sixty specimens of *Rehnia victoriae* this spine is present on both cephalic tibiae. Absence can be a matter of early injury, hence have a teratological background. Thus it is increasingly desirable that morphological features of more fundamental character be found and utilized to define generic or suprageneric categories.

It is quite evident that *Rehnia* and *Neobarrettia* are closer to some of the Neotropical genera of the Listroscelinae with which they have been compared, such as *Arachnoscelis,* than they are to the more divergent lines represented in tropical America by *Phlugis,* and in the Old World tropics and subtropics by *Xiphidiopsis.*

The removal of *Neobarrettia* and *Rehnia* from the Decticinae to the Listroscelinae is here made only after a comparative study of all the North American genera of the former subfamily and a considerable number of the extra-limital ones. Except where the Sonoran element penetrates into northern Mexico I know of no unquestioned decticines from the whole of America south of the United States. The present investigation carries the Listroscelinae definitely into North America as usually defined politically. I believe *Neobarrettia* and *Rehnia* represent a relatively early invasion of our territory from a more southern center of the subfamily, and that they have developed individually in their respective areas of arid or semi-arid conditions. The Rio Balsas valley, the home of *Neobarrettia,* is regarded by meteorologists as the hottest area of Central America.

Redescriptions of Ewing's Oribatid Mites, IV—Family Achipteriidae (= Notaspididae) (Acarina: Oribatei)[1]

By Tyler A. Woolley, Department of Zoology, Colorado A. & M. College, Fort Collins, Colorado

This article is another in the series which deals with redescriptions of Ewing's type species of oribatid mites. Pencil drawings were prepared by Dr. E. W. Baker of the U. S. National Museum and made available to the writer. Acknowledgment of the drawings is indicated by the initials on the finished plates. Ewing's original descriptions are followed as closely as possible, but modern acarological terms are substituted where necessary. The article is presented in somewhat cursory

[1] Research supported by a grant-in-aid from the National Science Foundation.

fashion since it is the intention of the writer to incorporate details later in a review or revision of the family.

Family Achipteriidae van den Hammen, 1952 (= Notaspididae Oudemans, 1900)

The anteriorly projecting cusps on the pteromorphae and the broad, medially-fused lamellae are the principal characteristics of this family of pterogasterine mites.

Both Grandjean (1936) and van der Hammen (1952) conclude that the name *Notaspis* is improperly used in this family since the generic designation as originally indicated by Hermann (1804) is applicable to eleven different mites. Accordings to the former authors the genus *Achipteria* Berlese, 1885, more properly designates the type genus in this family, and is characterized by slit-like pores on the dorsum of the hysterosoma.

This paper deals principally with two species in the genus *Achipteria* which were described by Ewing (1918) from collections in Oregon. In other publications (1909, 1910) he discusses several species of *Notaspis*. In this paper the writer proposes changes in the generic designations of these species and discusses their taxonomic relationships.

Achipteria oregonensis Ewing, 1918. (Figs. 1, 2)

Description: Cotype broken on left side of hysterosoma. Dark brown. Lamellae broad at base, completely obscuring rostrum and other aspects of propodosoma; each lamella with incurved antero-lateral margin and blunt tip, sclerotized medial margins from insertions of lamellar hairs to base of lamellae; a narrow U-shaped cleft between anterior half of sclerotized medial margins of lamellae, cleft extending from insertions of lamellar hairs half the distance to hysterosoma. Lamellar hairs about as long as widest width of lamellae, extended from insertions beyond anterior tip of lamellae, minutely pectinate and curved laterally at tips. Translamella a brief sclerotized bar at posterior margin of U-shaped cleft between lamellae. Interlamellar hairs barbed along entire length, about as long as lamellae, inserted close to

mesal edge of lamellae near anterior margin of hysterosoma, incurved at tips. Pseudostigmata deep, cup-like, in notch formed by latero-posterior margin of lamellae and curved medial bases of pteromorphae. Pseudostigmatic organs three-fourths as long as cusp of pteromorph, somewhat fusiform, with minute spines, projected forward between lamellae and pteromorphae.

Surface of hysterosoma smooth (broken on left side in cotype specimen), broadly oval in outline with angular shoulders and rounded posterior margin. Each pteromorph with an anterior cusp; cusp projecting forward, outward and downward at distal tip, about two-thirds as long as lamella, not reaching level of anterior margin of propodosoma. A single, simple dorsal bristle directly posterior to inner proximal margin of pteromorphal cusp, inserted its length posterior to hysterosomal margin; another simple bristle near latero-posterior margin of pteromorph. Other bristles and glandular fissures as shown in Fig. 1.

Camerostome broadly oval. Ventral plate distorted and broken in cotype specimen. Setae of ventral plate and apodemata as seen in Fig. 2. Genital opening nearly square, about two-thirds as large as anal opening; genital covers with 7 pairs of setae; g:1 and g:2 inserted in anterior margin of each cover; g:3, g:4, g:5, g:6 inserted in a longitudinal row in middle of cover; g:7 inserted mediad of this row and near posterior margin of cover. Anal aperture about twice as large as genital opening, each anal cover trapezoidal in outline and with two setae. Insertions of anal and adanal setae as in Fig. 2.

Legs described by Ewing (1918) as long and heterodactyle.

Length 771 μ, hysterosoma 614 μ; width 530 μ.

Several specimens were collected by H. E. Ewing from the ground beneath an old piece of wood at Corvallis, Oregon.

Achipteria borealis Ewing, 1918, nov. comb. (Figs. 3, 4)

Type: *Achipteria oregonensis* var. *borealis* Ewing, 1918, p. 84.

Description: Lamellae broad at base, tapered to a sharp point anteriorly, a deep V-shaped cleft between anterior tips and extending nearly half the distance to base of lamellae; medial

margins sclerotized from insertions of lamellar hairs posteriorly, where lamellae are separated slightly anterior to hysterosomal margin. Lamellar hairs simple, stouter than interlamellar hairs, projected slightly beyond anterior points of lamellae, inserted their lengths from anterior ends of lamellae in frontal tip of sclerotized medial margin. Interlamellar hairs nearly as long as lamellae, fine, simple, inserted in meso-posterior margin of lamellae, distal tips curved inward. Pseudostigmata cornuate beneath surface of hysterosoma at base of lamellae. Pseudostigmatic organs not seen.

Hysterosoma smooth, broadly oval; pteromorphae extended nearly two-thirds the length of lateral margin; anterior cusps nearly straight, projected forward about half the length of lamellae. Six pairs of setal insertions and two pairs of glandular fissures as shown in Fig. 3.

Details of ventral aspect obscured by dark color of specimen except for those shown in Fig. 4. Tectopedia I similar to the same structure in *A. oregonensis,* but ribbed on lateral margins. Genital and anal apertures as figured; genital and anal setae not visible.

Length 571 μ, hysterosoma 470 μ; width 356 μ.

Ewing (1918) collected a single specimen of this species under a rotting log at the top of Mary's Peak, Oregon.

Discussion: Ewing's original description (1918) of *Achipteria oregonensis* is accompanied by a single text-figure of the right pteromorphal cusp of one of the cotypes from Corvallis, Oregon. As originally described *A. borealis* differs in size and shape of the pteromorphal cusp. Further differences are noted, however, in the sclerotization of the lamellae and pteromorphae; in the lengths of lamellar and interlamellar hairs, which are stout and pectinate in *A. oregonensis* and simple in *A. borealis;* in the relative size of the two species, *A. borealis* is the smaller of the two. Ewing (1918) used the pteromorphal cusp to distinguish his described variety from the species. These other marked differences, however, are sufficient to justify the elevation of the variety to specific rank, in the opinion of the writer.

Both *A. oregonensis* and *A. borealis* differ from the known European species and from the Canadian species, *A. nivalis*

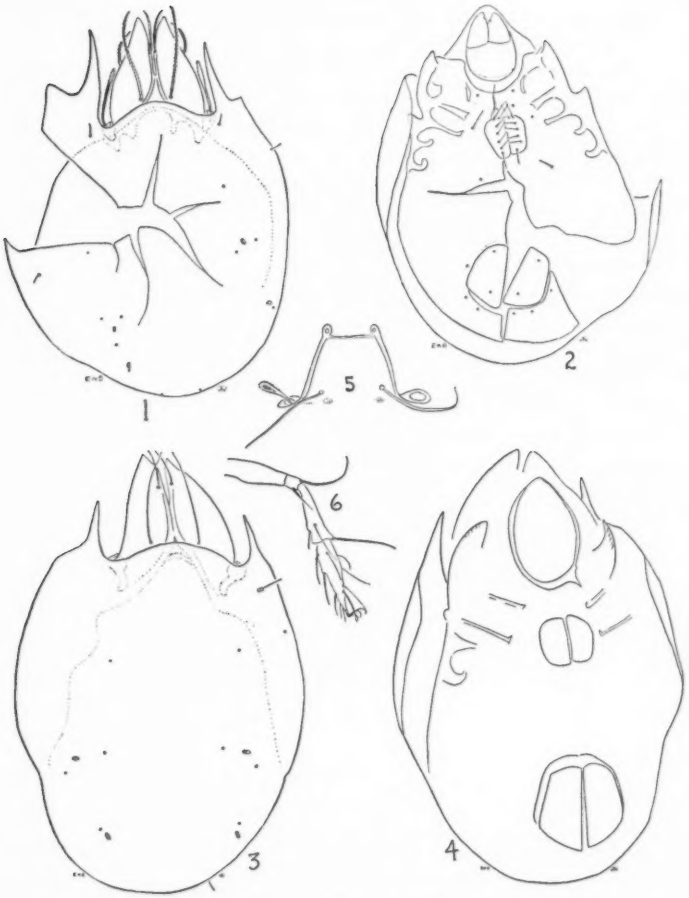

FIG. 1. *Achipteria oregonensis* Ewing, 1918, from the dorsal aspect. Left side of hysterosoma crushed.
FIG. 2. *Achipteria oregonensis* Ewing, 1918, from the ventral aspect. Left side of ventral plate broken.
FIG. 3. *Achipteria borealis* Ewing, 1918, from the dorsal aspect.
FIG. 4. *Achipteria borealis* Ewing, 1918, from the ventral aspect. Details obscured because of darkened specimen.
FIG. 5. *Notaspis texana* Ewing, 1909, part of propodosoma.
FIG. 6. A leg of *Notaspis texana* Ewing, 1909.

Hammer, 1952, in size and arrangement of lamellae, lamellar and interlamellar hairs.

Ewing (1909) describes other species of *Notaspis* which should be discussed. All cotypes of one of these, *Notaspis texana* Ewing, 1909, are smashed. The writer has drawn part of the propodosoma and the leg of one of these cotypes (Figs. 5, 6). The lamellae, pseudostigmata and interlamellar hairs indicate that this species is definitely not *Notaspis* nor *Achipteria*. It probably belongs in the genus *Zygoribatula*, but the condition of the specimens makes final determination impossible.

Notaspis brevirostris Ewing, 1910, and *Notaspis depilis* Ewing, 1909, also are species of indeterminate position. Neither appears to belong to *Achipteria*. The former is illustrated by a photograph which is not detailed enough to allow critical diagnosis. Analysis of the verbal description, in which there is no mention of pteromorphae, indicates that it is definitely not a species of *Achipteria*. The lamellae are short with free cusps, also in contradistinction to the large plates typical of *Achipteria*. Furthermore, the genital and anal apertures are nearly contiguous, a condition which is not characteristic of this genus. *Notaspis depilis* is much more characteristic of the genus *Zygoribatula*. In the opinion of the writer, these facts constitute sufficient justification to infer taxonomic misplacement of these two species. Their exact designation cannot be determined, however, until all of the specimens can be examined and compared with known species.

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New Oak-Inhabiting Species of Erythroneura from Illinois (Hemiptera, Cicadellidae)

By Herbert H. Ross, Illinois Natural History Survey, Urbana

Among the oak-inhabiting species of *Erythroneura* found in Illinois, those with a rigid restriction to shingle oak (*Quercus imbricaria*) and the black oaks (*Quercus nigra* group) are proving to have been the least understood. This situation is due to the relatively infrequent occasions when the collector encounters large populations of *Erythroneura* on these hosts. By good fortune, in the last two years we have found a few groves of these oaks having moderate to large leafhopper populations. On the basis of the large numbers of individuals thus available for study, it is now apparent that certain observed structural differences, previously suspected of being only variations of one or two species, in reality demark distinctive species segregates. It is these species which are described in this paper.

ERYTHRONEURA LENTA complex

In *Erythroneura lenta* and its immediate allies the body markings are scattered red bars and dots on a pale background, typical for the great majority of species in the *maculata* group; the style has either no posterior point or a minute one; the aedeagus is simple, deeper than thick; and the pygofer hooks are slender and either nearly straight, curved, or only moderately sinuate. To this complex belong *lenta* Beamer, *longa* Knull, *patris* Ross and DeLong, and several other species, some of them apparently undescribed.

Erythroneura marilandicae new species

Most closely related to *longa,* this species may be distinguished by the shorter, tapering shaft of the aedeagus and the more curved dorsal aspect of the pygofer hooks. In *longa* the latter are almost straight.

Color and general structure as in typically spotted members of the *lenta* complex. Male genitalia as in Fig. 1. Pygofer hook slender, extending considerably beyond pygofer, the latter aspect slightly curved ventrad, the dorsal aspect bowed, the two hooks converging toward apex. Style without posterior point (as in Fig. 3*E*). Aedeagus with curved internal apodeme; phalicata short, straight, and slightly tapering, lateral aspect only moderately deep, ventral aspect narrow.

Holotype ♂.—Meredosia, ILLINOIS, Sept. 8, 1954, on *Quercus marilandica,* Ross and Stannard. *Paratypes.*—All from Illinois; same data as holotype, 9 ♂; Forest City, Sept. 11, 1953, on *Q. marilandica,* Stannard and Ross, 1 ♂; same, but Sept. 8, 1954, 4 ♂; n. of Marion, Sept. 21, 1950, on *Q. velutina,* Ross and Evers, 1 ♂; Rocky Branch Cr., Oliver, Apr. 22, 1949, Ross and Stannard, 2 ♂; Starved Rock St. Pk., Sept. 7, 1951, on *Juglans cinerea,* Mills and Ross, 1 ♂; W. Vienna, Jn. 5, 1951, on *Ulmus alata,* Ross and Richards, 1 ♂.

Erythroneura econa new species

Based on general proportions of aedeagus and pygofer hooks, this species also is most closely related to *longa,* but differs in that the pygofer hooks diverge at apex and have an apparent twist to the apical portion, Fig. 2*A, B,* resulting in the apical half being abruptly narrowed in dorsal view.

Color and general structure as for typically spotted members of *lenta* complex. Male genitalia as in Fig. 2. Pygofer process extending just beyond apex of pygofer; in lateral view the base is narrow and the apical half is slightly wider (in some specimens this enlargement is not seen until the abdomen is rotated a few degrees from a strictly lateral position); in dorsal view the base is relatively thick and the apical half is abruptly thinner. Style without posterior point. Aedeagus with short, straight internal apodeme; shaft slender, moderately long, and almost straight.

Holotype ♂.—Neoga, ILLINOIS, Sept. 2, 1955, on *Quercus imbricaria,* Ross and Stannard. *Paratypes.*—Newton, Ill., Sept. 12, 1956, on *Q. imbricaria,* Ross and Selander, 8 ♂.

Erythroneura metopia new species

The ventrally-curved pygofer hook indicates a close relationship between this species and *patris,* from which *metopia* can be diagnosed by the angulate rather than gently curved pygofer hook and the very short aedeagal shaft.

Color and general structure typical for the *lenta* complex. Male genitalia as in Fig. 3. Pygofer hook slender, extending to end of pygofer and bent relatively sharply ventrad at midpoint; the two hooks, seen from dorsal view, converge slightly toward apex. Style without posterior point. Aedeagus with short internal apodeme; shaft unusually short for the complex, tapering and both shallow and narrow.

Holotype ♂.—Shawneetown, ILLINOIS, July 14, 1948, on *Quercus imbricaria,* Mills and Ross. *Paratypes.*—All from Illinois; same data as holotype, 3♂, 5♀; Danville, July 23, 1949, on *Q. imbricaria* and *Q. velutina,* DeLong and Ross, 2♂; n. of Marion, Sept. 21, 1950, on *Quercus* sp., Ross and Evers, 3♂; Fairfield, June 12, 1934, DeLong and Ross, 1♂; Newton, Sept. 11–12, 1956, on *Q. imbricaria,* Ross and Selander, 15♂.

Erythroneura alicia new species

On the basis of genitalic structures this species is closest to *longa* and *marilandicae,* from both of which it differs in the more sinuate pygofer hooks and sinuate aedeagal shaft. From all members of the *lenta* complex *alicia* differs in possessing three pink transverse bands across the dorsum, in position like the darker bands of *trivittata.*

Color pale with three transverse pink bands across the folded tegmina, one at the base including also the scutellum, one across the middle, and the third slightly before the apex. General structure typical for complex. Male genitalia as in Fig. 4. Pygofer hook slender and tapering, extending slightly beyond apex of pygofer, moderately sinuate from either lateral or dorsal view. Style without posterior point. Aedeagus with short internal apodeme; shaft short, only moderately deep, its lateral aspect definitely sinuate, its ventral aspect narrow.

Holotype ♂.—Neoga, ILLINOIS, Sept. 2, 1955, on *Q. imbricaria,* Ross and Stannard. *Paratypes.*—All from Illinois on *Q. imbricaria;* same data as holotype, 2 ♂, 7 ♀; nw. of Casey, Sept. 8, 1955, Ross, 2 ♂, 1 ♀; Dahlgren, Sept. 24, 1952, Ross and Evers, 2 ♂; Fairfield, June 12, 1934, DeLong and Ross; Newton, Sept. 12, 1956, Ross and Selander, 2 ♂, 1 ♀; Raymond, Sept. 29, 1955, Ross, 1 ♂.

ERYTHRONEURA TRIVITTATA complex

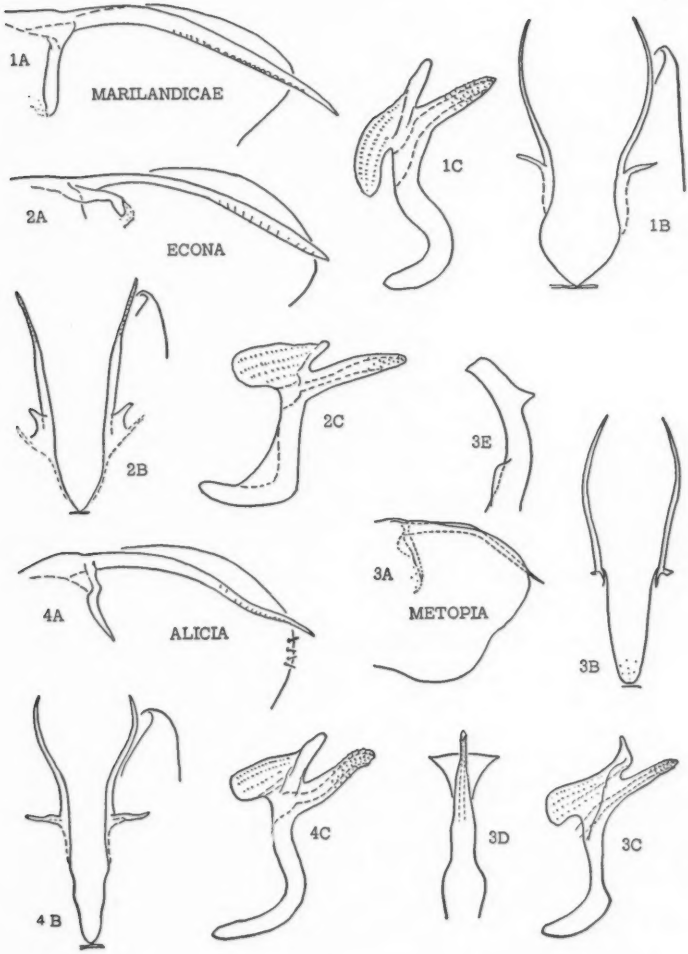
Two previously described species, *confirmata* McAtee and *trivittata* Robinson, form a distinctive small complex in which the style has both a posterior and anterior point, both slender and pointed, Fig. 5*E*. In *confirmata* the dorsal aspect (with wings folded) has an exquisite red saddle-like pattern, whereas in *trivittata* the dorsal aspect has a light ground color crossed by three nearly black transverse bands. Previously this banded pattern was considered diagnostic for the species *trivittata,* but we have discovered two additional species described below possessing this pattern. Shingle oak is the host for all four species of the complex.

Erythroneura amethica new species

This and the following species are close relatives of *trivittata* Robinson, possessing in common with it three conspicuous transverse red and black bands across the tegmina. *E. amethica* differs from the other two banded species in the shape of the pygofer hooks, which converge at the apex.

Male genitalia as in Fig. 5. Pygofer hook elongate, of nearly uniform thickness to near curved apex; dorsal aspect gently sinuate. Style with sharp anterior point and sharp, narrow posterior point. Aedeagus with base unusually large; phalicata nearly cylindrical, the apical half and most of the ventral margin spiculate; ventral aspect slightly irregular.

Holotype ♂.—Shawneetown, ILLINOIS, July 14, 1948, on *Quercus imbricaria,* Mills and Ross. *Paratypes.*—All from Illinois on *Q. imbricaria;* Dixon Springs, April 21, 1935, T. H.



FIGS. 1–4. Male genitalia of *Erythroneura*. *A, B,* pygofer hooks, lateral and dorsal aspects; *C, D,* aedeagus, lateral and ventral aspects; *E,* apical portion of style.

Frison, 1 ♀; Edgewood, June 5, 1955, Ross and Richards, 1 ♂; Sesser, Aug. 5, 1954, Ross and Moore, 2 ♂.

Erythroneura arpegia new species

Color and general structure as in the preceding species. Male genitalia as in Fig. 6. Pygofer hook quite unlike that of *trivittata* and *amethica* in that it is widened into a broad blade just before the middle, and the dorsal aspect is sharply angled laterad at the point of widening very much as in *paluloides* Ross. Style exactly as in *trivittata,* the posterior point being only half as long as in *amethica.* Aedeagus also very much as in *trivittata,* the base of normal size and the phalicata nearly cylindrical, with a scattering of short spicules.

Holotype ♂.—Adams County, ILLINOIS, north of Kinderhook, Sept. 9, 1954, on *Quercus imbricaria,* Ross and Stannard. *Paratypes.*—All from Illinois on *Q. imbricaria;* same data as holotype, 1 ♂; nw. of Casey, Sept. 8, 1955, H. H. Ross, 10 ♂; Danville, July 23, 1949, DeLong and Ross, 1 ♂; Neoga, Sept. 2, 1955, Ross and Stannard, 1 ♂.

ERYTHRONEURA TUMIDA complex

The species *tumida* Knull is unusual in the *maculata* group of *Erythroneura* in possessing a sickle-shaped style, much as in Fig. 7*E*. Two closely related species are here described, bringing to three the number of known species possessing this character.

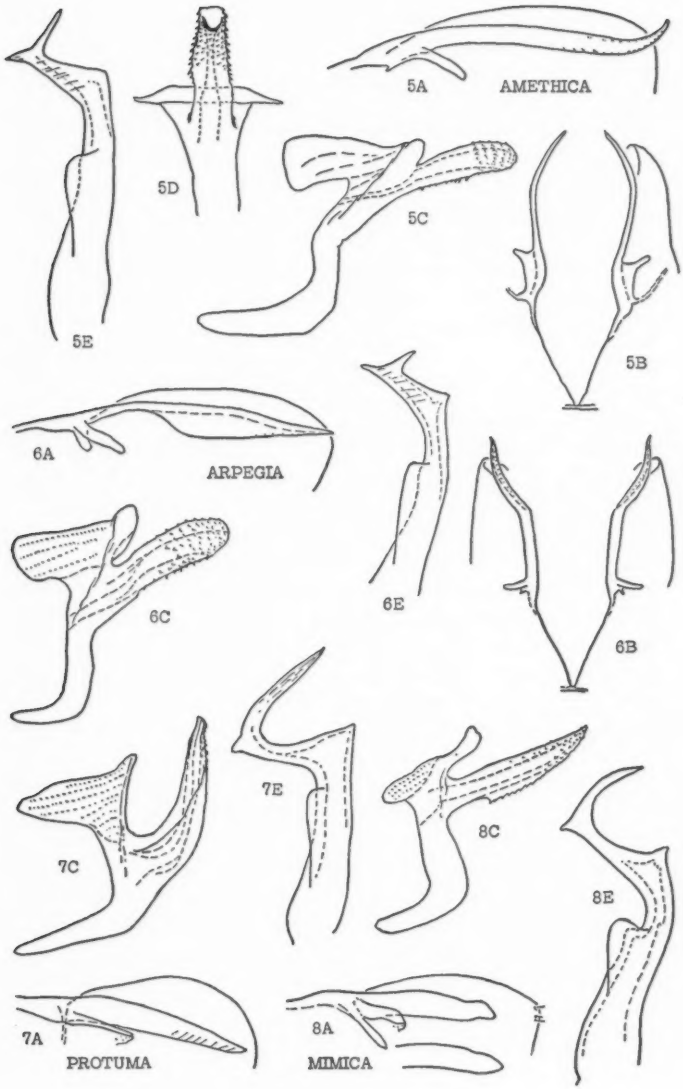
Erythroneura protuma new species

In structure of style and pygofer process this species resembles *tumida,* but differs markedly in the tapering flanges of the aedeagus.

Color pale with the usual pattern of red spots and bars found in most species of the *maculata* group. General structure typical

EXPLANATION OF FIGURES

FIGS. 5–8. Male genitalia of *Erythroneura. A, B,* pygofer hooks, lateral and dorsal aspects; *C, D,* aedeagus, lateral and ventral aspects; *E,* apical portion of style.


5A
AMETHICA
5D
5C
5E
5B
6A
ARPEGIA
6E
6C
6B
7E
7C
8C
8E
7A
PROTUMA
8A
MIMICA

for genus. Male genitalia as in Fig. 7. Pygofer process short and bladelike, almost straight, and not reaching apex of pygofer. Style with posterior point long and curved over foot so that the entire apex of the style is sickle shaped. Aedeagus with large, triangular internal apodeme; shaft arising from ventral area of socket, upturned, massive, and having lateral flanges which are moderately wide at the base and taper into the body of the shaft a short distance from the apex; apical portion of the shaft with a few small lateral teeth.

Holotype ♂.—Oregon, ILLINOIS, Sept. 27, 1956, on *Quercus borealis,* Ross and Stannard. *Paratypes.*—Same data, 4 ♂; same, but Sept. 15, 1955, on *Quercus alba,* 4 ♂.

Erythroneura mimica new species

This species resembles the preceding most closely but differs from it in the chubby apex of the pygofer hooks and the dorsal position of the aedeagal shaft on its socket.

Color and general structure as in the preceding species. Male genitalia as in Fig. 8. Pygofer hook short, ending some distance before the apex of the pygofer, and connected at its base with a strong surface thickening of the pygofer; the apical portion of the hook is slightly constricted just before the tip, and the latter is blunt. Style sickle-like, with long, curved posterior point. Aedeagus with small internal apodeme; shaft arising near dorsal part of socket, straight and tapering, its lateral margins forming serrate flanges which taper gradually to the tip of the shaft.

Holotype ♂.—Oregon, ILLINOIS, Sept. 15, 1955, on *Quercus borealis,* Ross and Stannard. *Paratypes.*—Same data, 2 ♂.

Nomenclature Notice

All comments relating to the following should be marked with the File Number, and sent in duplicate to Francis Hemming, 28 Park Village East, Regent's Park, London N.W.1, England.

Mansonia Blanchard, 1901, validation of (Order Diptera) (File No. Z.N.(S.) 553).

The Synonymy of Two Species of North American Chrysis, sens. str. (Hymenoptera, Chrysididae)

By KARL V. KROMBEIN, Entomology Research Branch,
United States Department of Agriculture,
Washington, D. C.

The synonymy proposed below is a result of a recent comparison of the types of several species of typical *Chrysis* described by Viereck and by Rohwer with those described by Aaron in the Academy of Natural Sciences of Philadelphia.

Chrysis (Chrysis) pattoni Aaron

Chrysis Pattoni Aaron, 1885. Trans. Amer. Ent. Soc. 12: 235.
Chrysis (*Tetrachrysis*) *decepta* Rohwer, 1909. Psyche 16: 90. NEW SYNONYMY.

The unique type of *decepta,* a female from Boulder, Colorado, in the U. S. National Museum, is extremely similar to the unique type of *pattoni,* a female from Colorado, differing in only a few details of infraspecific importance. The type of *pattoni* has the facial carina a little weaker and not so curved downward in middle, head in frontal view but quite so strongly arched above, and small area immediately basad of median apical emargination of third tergum flatter.

Chrysis (Chrysis) propria Aaron

Chrysis propria Aaron, 1885. Trans. Amer. Ent. Soc. 12: 238.
Chrysis (*Tetrachrysis*) *kahli* Viereck, 1906. Trans. Amer. Ent. Soc. 32: 194. NEW SYNONYMY.
Chrysis (*Tetrachrysis*) *pattonella* Viereck, 1906. Trans. Amer. Ent. Soc. 32: 194. NEW SYNONYMY.

The unique male type of *kahli* from Kansas and of *pattonella* from Hamilton County, Kansas, both in the University of Kansas collection, are very similar to each other in details of the sculpture and vestiture. They differ in color, that of *kahli* being blue, while that of *pattonella* is green. Both agree very well in

all details of sculpture with the male lectotype (selected by Cresson) of *propria* from Montana.

The type series of *propria* is a mixed one, and includes representatives of at least two and possibly three species. Four of the available paratypes are females, and two are males (the original type series consisted of eight specimens).

One male and two females from Montana and one female from Colorado are conspecific with the lectotype. A male from California is perhaps different—the facial carina is absent, the head and thorax are not so closely punctate, and the apical teeth of third tergum are shorter. The female from Arizona is certainly a distinct species—it is the only member of the type series having the pronotum longer than the head (shorter than the head in the others), and the pronotal punctures are much larger and the median pronotal groove extends almost to the posterior margin.

I am indebted to G. W. Byers of the Department of Entomology, University of Kansas, for making available the types of typical *Chrysis* described by Viereck.

(*Continued from p. 174*)

method really so "practical?" Every farmer and grower knows his pests, and his local store will provide the latest insecticide with full instructions. It is when a new insect appears, or when one has a plant not in the book, or one is confronted with some other novel situation that one must draw on whatever general knowledge and understanding of insects that one may have. This fundamental (often called theoretical or impractical) knowledge then turns out to be the truly useful, and can be applied to the specific situation.

This book, with its truly entomological approach, is a valuable addition to our list of applied text-books; it represents a return to the method of the renowned John B. Smith's "Economic Entomology" of a past generation. It is hoped that it will be followed by other editions, or other applied texts, in which, *in fairness to the student,* still more general entomology is set forth, including, particularly, more of the general ecological side of insect life.—R. G. SCHMIEDER.

Chalcidoid Wasps (Eulophidae, Eurytomidae) Reared from the Bullet Gall Caused by Disholcaspis mamma (Cresson) (Cynipidae)

By W. W. Judd, Department of Zoology, University of Western Ontario, London, Ontario

On March 31, 1956, several galls were collected from twigs on a sapling of Bur Oak, *Quercus macrocarpa,* in a copse of hardwood trees on the north shore of Fanshawe Lake in London Township, Middlesex County, Ontario. The galls were in three clusters on the twigs with 11, 3 and 7 galls, respectively, in the three clusters. They were identified with keys in Felt (1940) as the Rough Bullet Gall caused by the cynipid wasp *Disholcaspis mamma* (Cresson). This species is included as a gall-maker on *Q. macrocarpa* by Muesebeck *et al.* (1951). Most of the galls were about 1.5 cm. in diameter, a few of them being smaller than this. When the galls were dissected after the rearing of insects from them had been completed it was found that each gall consisted of a solid, woody exterior wall about 5 mm. thick and, within this, a separable central capsule with a tough, thin wall. This capsule could be rolled out of the gall intact and resembled a small, yellow pea 4 mm. in diameter. The capsule from one of the galls, opened on the day of the collection, contained 26 small, white hymenopterous larvae. Only one gall showed an emergence hole, 1.5 mm. in diameter.

Each of the remaining 20 intact galls was placed in a cotton-plugged vial of dimensions 60 mm. × 15 mm. and kept on a rack in a laboratory. Each day the vials were examined for the presence of emerged insects and these were pinned and labelled or preserved in fluid. On January 31, 1957, the galls were split open and insects remaining in them were removed. Of the 20 galls, 4 yielded adults of the wasp *Eurytoma querci-globuli* (Fitch), 1 showed an emergence hole perhaps made by *E. querci-globuli,* 9 yielded adult wasps, *Tetrastichus phegus* Burks, 3 contained molded contents in their capsules and 3 were small

and undeveloped with aborted central capsules. The numbers of wasps that emerged from or were found in the galls are presented in Table 1. All specimens are deposited in the collection of the Department of Zoology, University of Western

TABLE 1. Numbers of wasps reared and collected from the galls

Date 1956	*Tetrastichus phegus*			*Eurytoma querci-globuli*
	♂	♀	Total	♀
May 30	9	9	18	
31	7	14	21	
June 1	7	14	21	
3	1	14	15	
4	0	1	1	
5	19	18	37	
18				1
22				1
28				1
July 3				1
1957				
Jan. 31	22	47	69	
Total:	65	117	182	4

Ontario except 1 female *E. querci-globuli* and 3 male and 4 female *T. phegus* which are deposited in the United States National Museum.

EULOPHIDAE

Tetrastichus phegus Burks

Nine of the galls yielded 65 male (36%) and 117 female (64%) *T. phegus*. Many of these emerged from six of the galls between May 30 and June 5 (Table 1) and the remainder were found in three galls when they were dissected. The wasps emerged from the galls through circular holes in the wall 0.7 mm. in diameter. In some galls all the wasps emerged from a single hole in the gall and in other galls from two or three holes. Those wasps which failed to emerge from three of the galls

were found dead in the central capsule of one gall and jammed between the wall of the capsule and the solid exterior wall in two galls. The distribution of sexes of the wasps from each of the nine galls was as follows: (11 ♂♂, 13 ♀♀), (1 ♂♂, 14 ♀♀), (19 ♂♂, 18 ♀♀), (8 ♂♂, 11 ♀♀), (9 ♂♂, 12 ♀♀), (6 ♂♂, 14 ♀♀), (14 ♀♀), (9 ♂♂, 13 ♀♀), (2 ♂♂, 8 ♀♀). *T. phegus* is a wasp described by Burks (1943) from specimens reared from cynipid galls of the genera *Disholcaspis* and *Heteroecus,* including paratypes from *D. mamma.*

Eurytomidae

Eurytoma querci-globuli (Fitch)

Four female *E. querci-globuli* emerged from four galls between June 18 and July 3 (Table 1), after *T. phegus* had ceased emerging, and no gall yielded these two species. *E. querci-globuli* emerged through a circular hole 1.5 mm. in diameter in the wall of the gall. In addition one gall, examined on the day of collection, showed an emergence hole of the same diameter. *E. querci-globuli* is included by Muesebeck *et al.* (1951) as a parasite of galls of the genus *Disholcaspis.*

Acknowledgment

Dr. B. D. Burks, United States National Museum, kindly examined and identified the wasps, *T. phegus* and *E. querci-globuli,* and specimens of the gall, *D. mamma.*

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Felt, E. P. 1940. Plant galls and gall makers. Comstock Publ. Co., Ithaca.

Muesebeck, C. F. W., K. V. Krombein, H. K. Townes *et al.* 1951. U. S. Dept. Agric., Agric. Monogr. No. 2.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Conopidae of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, Dept. of Entomology, N. C. State College, Raleign, N. C.

Bembicini and Stizini (Hym., Sphec.) of New World wanted for revis. study. Will return upon request or at end of project. James E. Gillaspy, Dept. of Zoology, Univ. Texas, Austin 12, Texas.

Agapema galbina. Will exchange cocoons of this moth for nature books. E. Frizzell, Route 4, Box 96, San Benito, Texas.

Tenebrionidae of the World wanted, in exchange for insects of Argentina and neighboring countries. Horacio J. Molinari, Av. Lib. Gral. San Martin 55, Acassuso (Buenos Aires), Rep. Argentina.

Butterflies. Wish to exchange specimens for Japanese species. Please write to Ichiro Nakamura (Boy, age 16), 26 Aza-Nishiyama Obayashi Takarazuka-shi, Hyogo-Ken, Japan.

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THE NEOTROPICAL SPECIES OF THE 'SUBGENUS AESCHNA' SENSU SELYSII 1883 (Odonata)

By Philip P. Calvert

This paper presents an account of the Neotropical species referred by de Selys in 1883 to his subgenus *Aeschna* and of some species unknown to him. His subgenus is here divided into three genera, *Aeschna, Coryphaeschna,* and *Castoraeschna, Aeshna* in its turn being subdivided into the subgenera *Aeschna, Hesperaeschna, Rhionaeschna, Schizuraeschna, Marmaraeschna* and *Neureclipa.* These five subgenera include 2, 15, 1, 3, 4 and 5 species and subspecies respectively. *Coryphaeschna* embraces 9 species and subspecies, *Castoraeschna* 5. Larvae of 2 species of *Hesperaeschna,* 1 species of *Schizuraeschna,* 1 species of *Neureclipa* and 6 species of *Coryphaeschna* are described and figured. Generalities are discussed under the headings: Relationships of the Neotropical Aeshnas to the North American fossils; Relations of the South American Aeshnas to the Palaearctic and Australian species; The geological age and geographical distribution of the ancestors of the Odonata and of the Mammalia; Relations of the Neotropical Aeshnas to each other; The seasonal distribution of the Neotropical species of Aeshna. Forty plates in black and white illustrate the structural and colorational features of the adults, seven those of the larvae. Nineteen tables show the variations in size and in venation of the adults. Six maps show the geographic distribution of all the species concerned. There is an alphabetical index of species, subgenera, genera, authors quoted, and topics.

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